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Operation and Maintenance Manual

390F L EXCAVATOR

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SEBU8587-13 390F Excavator 2
M0085431-02 Regulatory Compliance Information 784
SEBU8358-07 Cat® Grade Control Depth & Slope for E-Series and F-Series Excavators 815

Foreword 2
Maintenance Section 6
Operation Section 292
Product Information Section 631
Reference Information Section 683
Safety Section 686
Warranty Section 781

Product: EXCAVATOR
Model: 390F L EXCAVATOR MGF
Configuration: 390F L Excavator MGF00001-UP (MACHINE) POWERED BY C18 Engine

Operation and Maintenance Manual
390F Excavator

Media Number -SEBU8587-13 **Publication Date -01/09/2015** **Date Updated -23/02/2018**

s03548206

Foreword

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

WARNING - This product can expose you to chemicals including ethylene glycol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to:

www.P65Warnings.ca.gov

Do not ingest this chemical. Wash hands after handling to avoid incidental ingestion.

WARNING - This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information go to:

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety information, operation instructions, transportation information, lubrication information, and maintenance information.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. Read, study, and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please consult your Cat dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance, and repair on this machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine controls, attachment controls, transportation, and towing information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating, and stopping the machine.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The Maintenance Interval Schedule (MIS) lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the "When Required" service interval. The Maintenance Interval Schedule lists the page number for the step-by-step instructions required to accomplish the scheduled maintenance. Use the Maintenance Interval Schedule as an index or "one safe source" for all maintenance procedures.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if the calendar intervals provide more convenient servicing schedules and approximate the indicated service hour meter reading. Perform the recommended service at the interval that occurs first.

Under severe, dusty, or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals chart might be necessary.

Perform service on items at multiples of the original requirement. For example, at every 500 service hours or 3 months, also service those items listed under every 250 service hours or monthly and every 10 service hours or daily.

Certified Engine Maintenance

Proper maintenance and repair are essential to keep the engine and machine systems operating correctly. As the heavy-duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter, or to render inoperative, any emission-related device or element of design installed on or in an engine or machine that is in compliance with all applicable regulations of the intended country to which it has been shipped. Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system, and cooling system may be emission-related and should not be altered unless approved by Caterpillar.

Machine Capacity

Additional attachments or modifications may exceed machine design capacity which can adversely affect performance characteristics. Included would be stability and system certifications such as brakes, steering, and rollover protective structures (ROPS). Contact your Cat dealer for further information.

Product Identification Number

Effective First Quarter 2001 the Product Identification Number (PIN) has changed from 8 to 17 characters. To provide uniform equipment identification, construction equipment manufacturers are moving to comply with the latest version of the product identification numbering standard. Non-road machine PINs are defined by ISO 10261. The new PIN format will apply to all machines and generator sets. The PIN plates and frame marking will display the 17 character PIN. The new format will look like the following:

This is the sample of the manual

Click on the download link for complete manual

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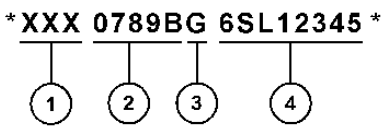

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

4. Machine Indicator Section (MIS) or Product Sequence Number (characters 10-17). These were previously referred to as the Serial Number.

Machines and generator sets produced before First Quarter 2001 will maintain their 8 character PIN format.

Components such as engines, transmissions, axles, and work tools will continue to use an 8 character Serial Number (S/N).

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Engine Oil and Filter - Change 5
Engine Valve Lash and Fuel Injector Timing - Check 12
Engine Oil Sample - Obtain 13
Engine Valve Rotators - Inspect 14
Engine Oil Level - Check 16
Ether Starting Aid Cylinder - Replace - If Equipped 19
Engine Crankcase Breather - Clean 22
Engine Air Filter Secondary Element - Replace 24
Film (Product Identification) - Clean 26
Final Drive Oil - Change 29
Engine Air Filter Primary Element - CleanReplace 31
Final Drive Oil Level - Check 38
Final Drive Oil Sample - Obtain 40
Diesel Particulate Filter - Clean 42
Fuel System - Prime 43
Diesel Exhaust Fluid - Fill 45
Fuel System Primary Filter (Water Separator) Element - Replace 48
Diesel Exhaust Fluid Injector - Replace 51
Fuel System Secondary Filter - Replace 53
Diesel Exhaust Fluid Filter - Replace 56
Fuel System Water Separator - Drain 59
DEF Manifold Filters - Replace 61
DEF Filler Screen - Clean 67
Fuel Tank Cap and Strainer - Clean 69
Counterweight Removal Chain - Lubricate - If Equipped 71
Fuel Tank Water and Sediment - Drain 73
Counterweight Removal Chain - Inspect - If Equipped 75
Fuel Tank Cap Filter - Replace 76
Counterweight Removal Chain - Clean - If Equipped 78
Fuses - Replace 80

Cooling System Coolant Sample (Level 2) - Obtain 86
High Intensity Discharge Lamp (HID) - Replace - If Equipped 87
Cooling System Coolant Sample (Level 1) - Obtain 89
Cooling System Coolant Level - Check 92
Hydraulic System Filter Element (Fine Filtration) - Replace - If Equipped 95
Cooling System Coolant Extender (ELC) - Add 97
Hydraulic System Oil - Change 99
Hydraulic System Oil Filter (Case Drain) - Replace 108
Cooling System Coolant (ELC) - Change 113
Hydraulic System Oil Filter (Pilot) - Replace 117
Condenser (Refrigerant) - Clean 122
Hydraulic System Oil Filter (Return) - Replace 124
Hydraulic System Oil Level - Check 136
Circuit Breakers - Reset 140
Camera - Clean - If Equipped 142
Hydraulic System Oil Sample - Obtain 145
Indicators and Gauges - Test 146
Cab Door Latch - InspectAdjustReplace 148
Cab Air Filter (Fresh Air) - CleanReplace 152
Oil Filter (Hydraulic Hammer) - Replace 154
Bucket Tips - InspectReplace (2) 159
Oil Filter - Inspect 168
Bucket Tips - InspectReplace 170
Radiator Core - Clean 180
Receiver Dryer (Refrigerant) - Replace 182
Bucket Linkage - InspectAdjust 184
Rollover Protective Structure (ROPS) - Inspect 187
Boom, Stick and Bucket Linkage - Lubricate 189
Seat Belt - Inspect 194

Seat Belt - Replace 196
Belt - InspectAdjustReplace 198
Battery or Battery Cable - InspectReplace 200
Swing Bearing - Lubricate 202
Battery Hold-Down - Tighten 204
Swing Drive Oil - Change 205
Battery Electrolyte Level - Check 210
Swing Drive Oil Level - Check 211
Battery - Recycle 214
Swing Drive Oil Sample - Obtain 215
Battery - Clean 217
Swing Gear - Lubricate 218
ARD Spark Plug - Clean 222
Track Adjustment - Adjust 225
Air ConditionerCab Heater Filter (Recirculation) - InspectReplace 230
Track Adjustment - Inspect 232
Air Cleaner Dust Valve - CleanInspect 233
Travel Alarm - Test - If Equipped 234
Maintenance Interval Schedule 236
Undercarriage - Check 241
Window Washer Reservoir - Fill 243
Severe Service Application 245
Window Wiper - InspectReplace 247
Welding on Machines and Engines with Electronic Controls 248
Window - Check 250
System Pressure Release 251
Service Interval Chart 259
S·O·S Information 263
Windows - Clean 264
Capacities (Refill) 266

Lubricant Viscosities - Fluids Recommendations 268
Access Door and Cover Locations 282

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i06659336

Engine Oil and Filter - Change

SMCS - 1318-510

Selection of the Oil Change Interval

NOTICE

A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

CAT oil filters are recommended.

Recommended multigrade oil types are listed in Table 1. Do not use single grade oils.

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or extremely dusty conditions may require a reduction in engine oil change intervals from the recommendations in Table 1. Also refer to Manual, SEBU5898, "Cold-Weather Recommendations". Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. See your Caterpillar dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Table 1

Engine Oil Change Interval[1]	

Multigrade Oil Type	Operating Conditions		
	Standard [1]	Severe	
		Fuel Sulfur above 0.3% [2]	Altitude above 1830 m (6000 ft)
Cat DEO Preferred	500 hr	250 hr	250 hr[3]
ECF-2 Preferred	500 hr	250 hr	250 hr
ECF-1-a	500 hr	150 hr[3]	250 hr[3]

[1] The traditional oil change interval for engines is 250 hours. The standard oil change interval in this machine is 500 hours, if the following conditions are met. Acceptable operating conditions, recommended oil types, and an S·O·S oil sampling and analysis program are used. This standard interval is not permitted for other machines. Refer to the applicable Operation and Maintenance Manuals for the other machines.

[2] For sulfur content above 0.1%, refer to this topic in the Manual, SEBU6250, "Caterpillar Machine Fluid Recommendations".

[3] Use Program B below to determine an appropriate interval.

Adjustment of the Oil Change Interval

Note: Your Cat dealer has additional information on this program.

Program B

Optimizing Oil Change Intervals

Begin with a 250-hour oil change interval. The oil change intervals are adjusted by increments. Each interval is adjusted an additional 50 hours. Periodic oil sampling and analysis are done during each interval. The analysis includes oil viscosity and infrared (IR) analysis of the oil. Repeat Program B if you change the application of the machine.

If an oil sample does not pass the analysis, shorten the oil change interval.

References

Reference: Form, PEDP7035, "Optimizing Oil Change Intervals"

Reference: Form, PEDP7036, "S·O·S Fluid Analysis"

Reference: Form, PEHP7076, "Understanding the S·O·S Oil Analysis Tests"

Procedure for Changing the Engine Oil and Filter

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

Park the machine on a level surface. Stop the engine.

Note: Drain the crankcase while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

Note: Run the engine at low idle for at least ten minutes before performing any other operations everytime oil and oil filter are changed in order to protect your engine. Refer to "Operation Maintenance Manual" , Engine and Machine Warm-up.

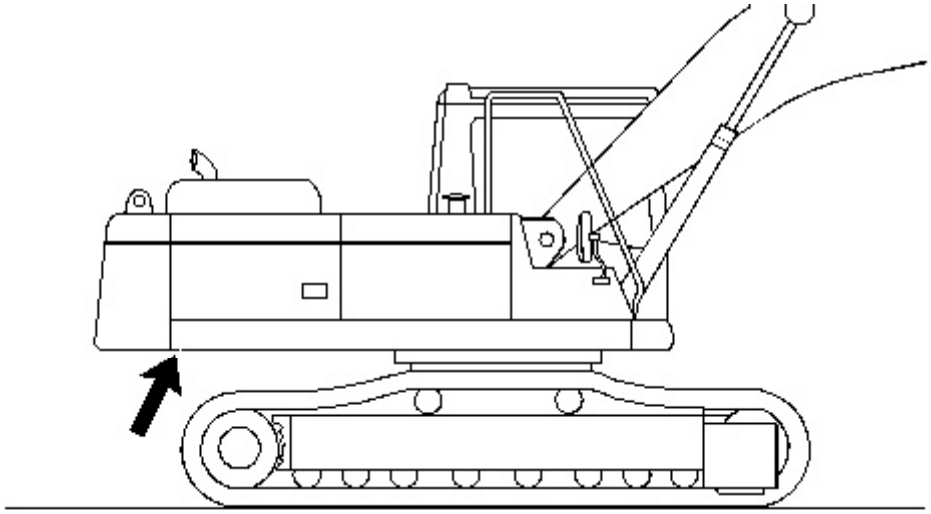

Illustration 1 g01173883

The drain hose for the engine crankcase is located under the rear of the upper structure.

1. Remove the bolts and the washers for the crankcase drain valve access cover. Remove the access cover.

   Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

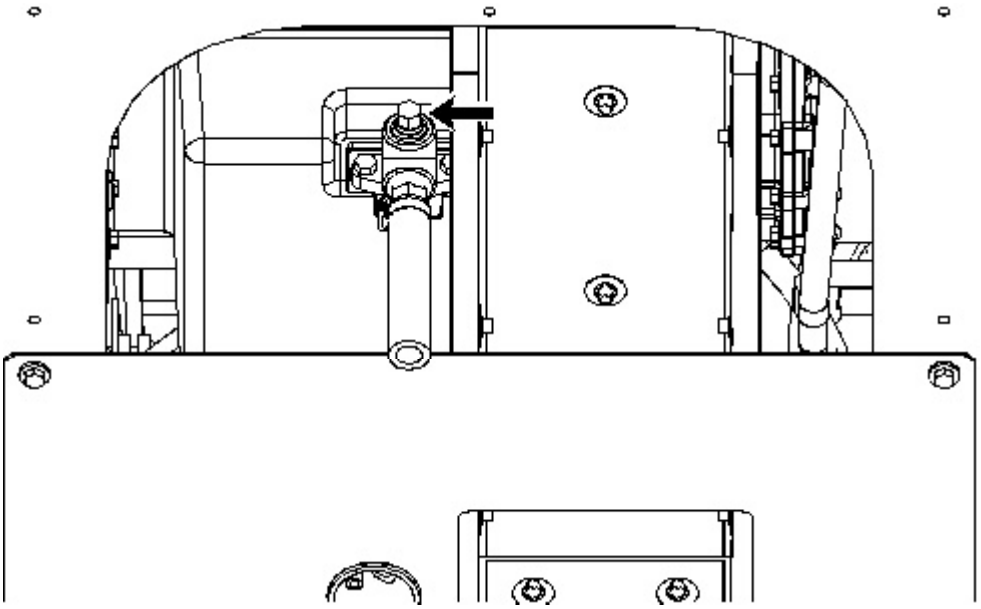

Illustration 2 g01114904

2. Open the crankcase drain valve. Allow the oil to drain into a suitable container.

   Note: Dispose of drained fluids according to local regulations.

3. Close the drain valve.
4. Open the access door to the engine compartment.

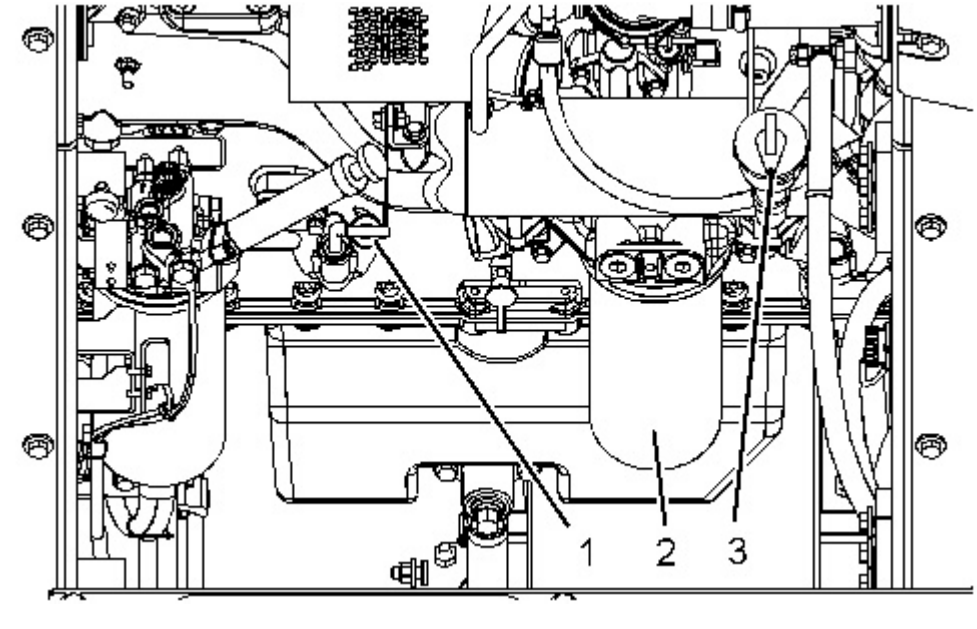

Illustration 3 g01114767

(1) Dipstick
(2) Filter
(3) Filler plug

5. Remove the oil filter (2) with a strap type wrench.

Note: Dispose of the used oil filter according to local regulations.

6. Inspect the oil filter. See Operation and Maintenance Manual, "Oil Filter - Inspect".
7. Clean the filter housing base. Make sure that all of the old filter gasket is removed.

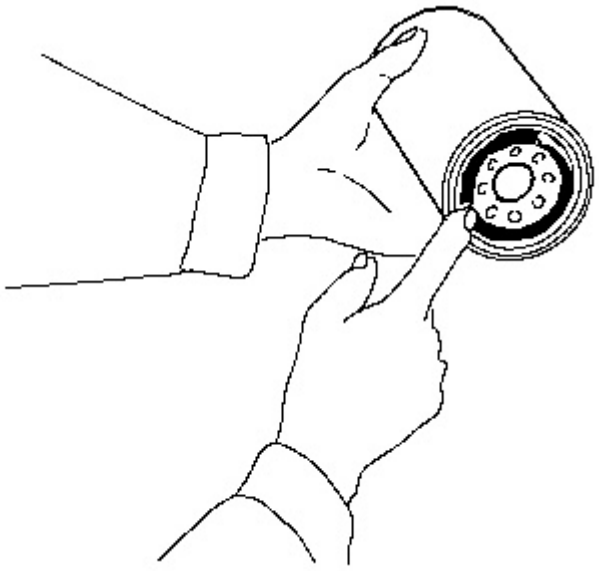

Illustration 4 g00101634

8. Apply a thin coat of engine oil to the gasket of the new filter.

   Note: There are rotation index marks on each engine oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten engine oil filters, use the rotation index marks as a guide.

9. Install the engine oil filter hand tight until the seal of the engine oil filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.
10. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide.
11. Unscrew the oil filler plug (3) and remove the oil filler plug.
12. Fill the crankcase with new oil. See Operation and Maintenance Manual, "Capacities (Refill)".
13. Clean the oil filler plug and install the oil filler plug.

NOTICE

Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

NOTICE

Operating your engine when the oil level is above the "FULL" mark could cause your crankshaft to dip into the oil. The air bubbles created from the crankshaft dipping into the oil reduces the oil's lubricating characteristics and could result in the loss of power or engine failure.

14. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.
15. Wait for 30 minutes so that the oil can drain back into the crankcase, before you check the oil.
16. Remove the dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

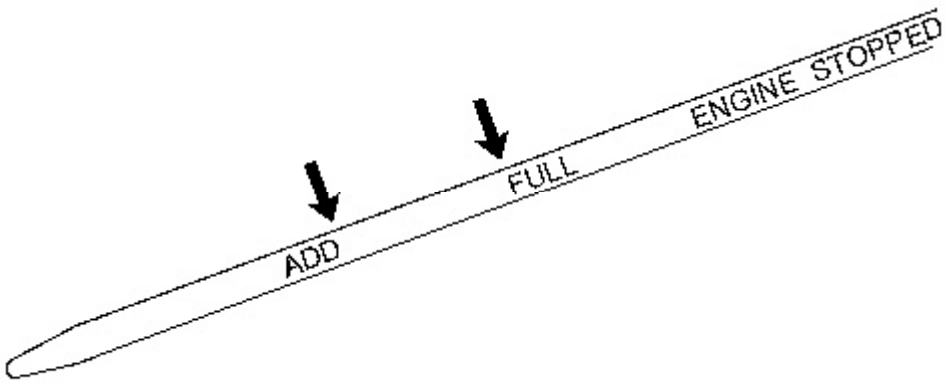

Illustration 5 g01100724

17. Remove the dipstick again. Make sure that the oil level is between the "ADD" and "FULL" marks on the "ENGINE STOPPED" side of the dipstick.
18. Close the engine hood and latch the engine hood.
19. Install the crankcase drain valve access cover with the bolts and the washers.

Fast Fill

If your machine is equipped with a deluxe service center, you may drain the hydraulic oil through the fast fill port. You may also add the hydraulic oil through a fast fill port.

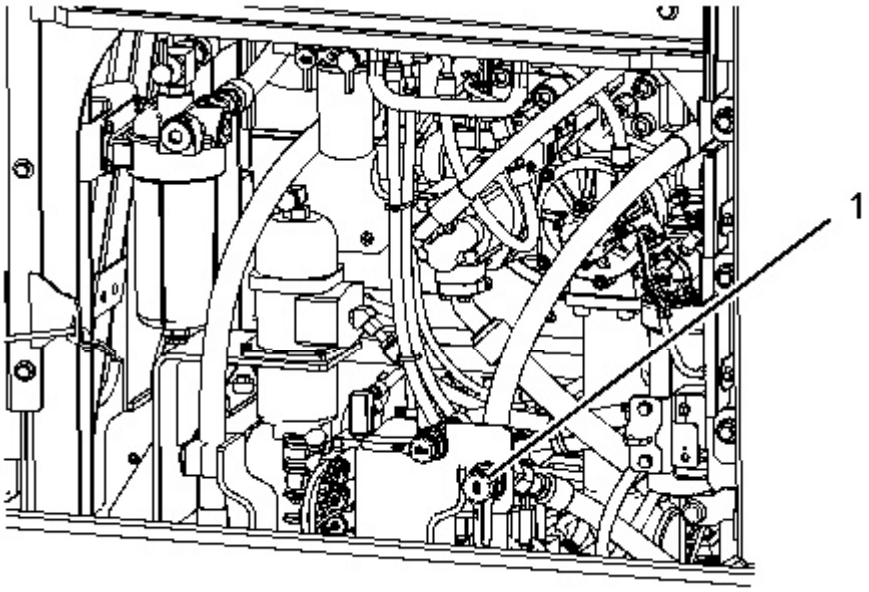

Illustration 6 g03234316

1. Open the access door on the right side of the machine.
2. Remove the dust cover (1).
3. Attach the hose to the male coupling.

   Note: Make sure that the coupling and receiver are free from debris before attaching. Reinstall the dust covers when done.
4. Drain the oil or add the oil, as needed.
5. Install the dust cover.

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i00707053

Engine Valve Lash and Fuel Injector Timing - Check

SMCS - 1105-025; 1209-535; 1290-531-FT

Refer to the Service Manual for the complete procedure for checking the engine valve lash. This procedure lists the steps for the engine valve lash adjustment and the steps in order to check the engine valve lash.

Note: Make sure that a qualified mechanic works on the injector fuel timing. Special tools and training are required.

Refer to the Service Manual for the complete procedure for checking the injector fuel timing or for adjusting the injector fuel timing.

Note: The correct fuel timing specification is given on the Engine Information Plate. Fuel timing specifications may differ for distinct engine applications and/or power ratings.

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i05798761

Engine Oil Sample - Obtain

SMCS - 1000-008; 1000; 1348-008; 1348-554-SM; 7542-008; 7542-554-OC; 7542-554-SM

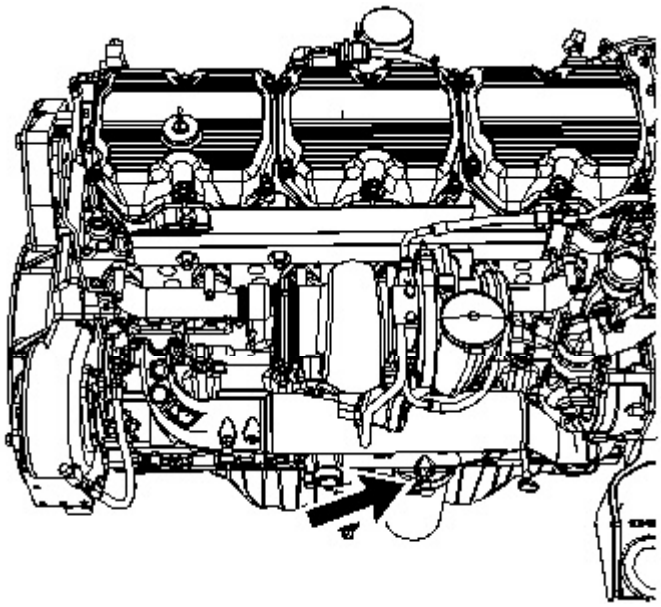

Illustration 1 g03510198

Obtain a sample of the engine oil from the engine oil sampling valve that is located in the engine compartment. Refer to Special Publication, SEBU6250, "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample" for more information about obtaining a sample of the engine oil.

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i00059702

Engine Valve Rotators - Inspect

SMCS - 1109-040

WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn to prevent being burned by hot oil spray.

1. Start the engine and run the engine at low idle.

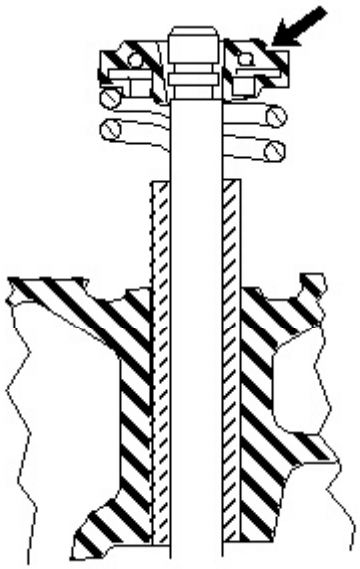

Illustration 1 g00102025

2. Watch the top surface on each valve rotator. Each valve rotator should turn slightly whenever the cylinder valve closes.

If a cylinder valve fails to rotate, consult your Caterpillar dealer.

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i02207916

Engine Oil Level - Check

SMCS - 1000-535

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

Note: This machine's monitoring system checks fluid levels. However, if the machine is on an incline or the engine has been stopped only for a short time, the engine oil does not return to the crankcase. The fluid level cannot be properly checked. Park the machine on level ground and check the oil level after the engine has been stopped for at least 30 minutes.

The oil level can be checked while the engine is running. The oil level can also be checked while the engine is stopped. The recommended procedure is checking the oil while the engine is stopped.

1. Unlatch the engine hood and raise the engine hood.

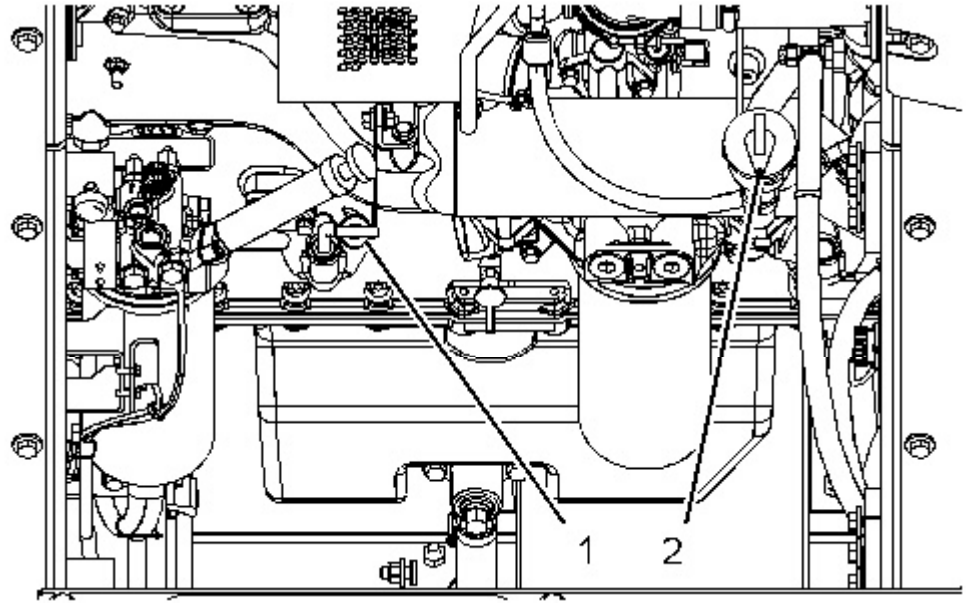

Illustration 1 g01114758

(1) Dipstick for the engine oil
(2) Filler plug for the engine oil

2. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

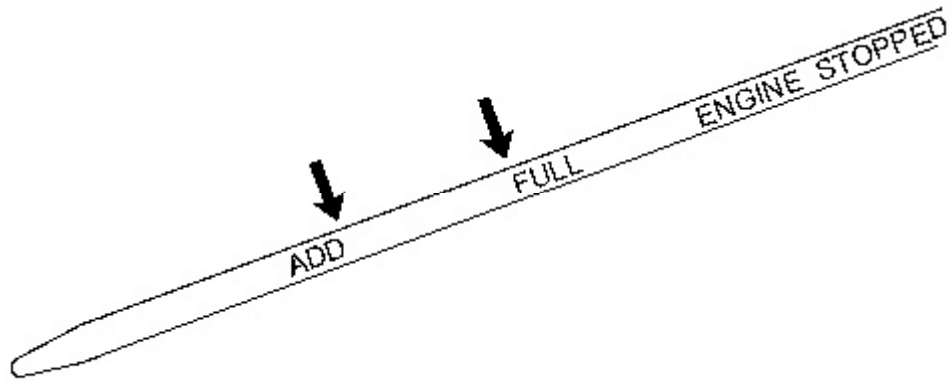

Illustration 2 g01100724

3. Remove the dipstick again. Make sure that the oil level is between the "ADD" and "FULL" marks on the "ENGINE STOPPED" side of the dipstick.

4. If the oil level is too low go to Step 5. Otherwise, proceed to Step 8.

   Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

5. Unscrew oil filler plug (2) and remove the oil filler plug.

Note: Oil that is badly contaminated or deteriorated should be replaced early regardless of the change interval.

NOTICE

Operating your engine when the oil level is above the "FULL" mark could cause your crankshaft to dip into the oil. The air bubbles created from the crankshaft dipping into the oil reduces the oil's lubricating characteristics and could result in the loss of power.

---

6. Add oil until the oil level is between the "ADD" and "FULL" marks on the "ENGINE STOPPED" side of the dipstick.
7. Clean the filler plug and install the filler plug.
8. Close the engine hood and latch the engine hood.

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i04688455

Ether Starting Aid Cylinder - Replace - If Equipped

SMCS - 1456-510-CD

WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

To avoid possible injury, be sure the brakes are applied and all controls are in Hold or Neutral when starting the engine.

The ether cylinder is located inside the rear access door on the left side of the machine.

Refer to Operation and Maintenance, "Fire Prevention and Explosion Prevention" before you replace the ether cylinders.

1. Open the rear access door on the left side of the machine.

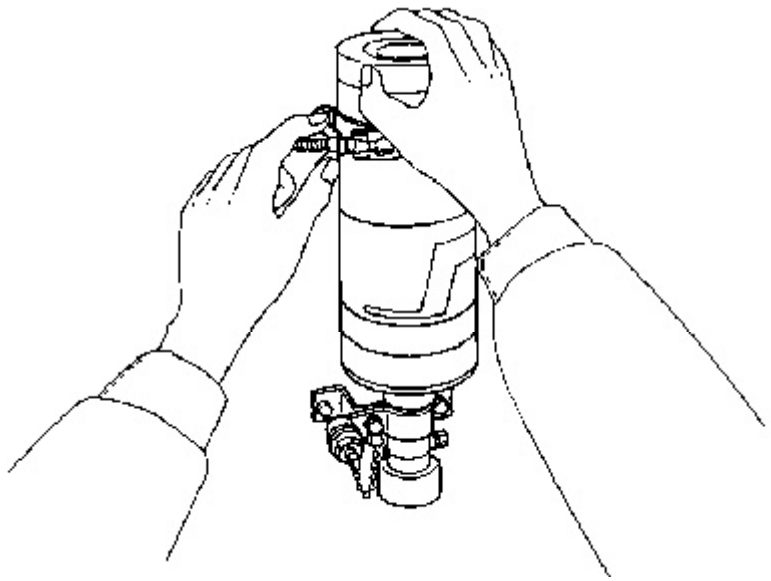

Illustration 1 g00751767

2. Loosen the cylinder retaining clamp.
3. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.

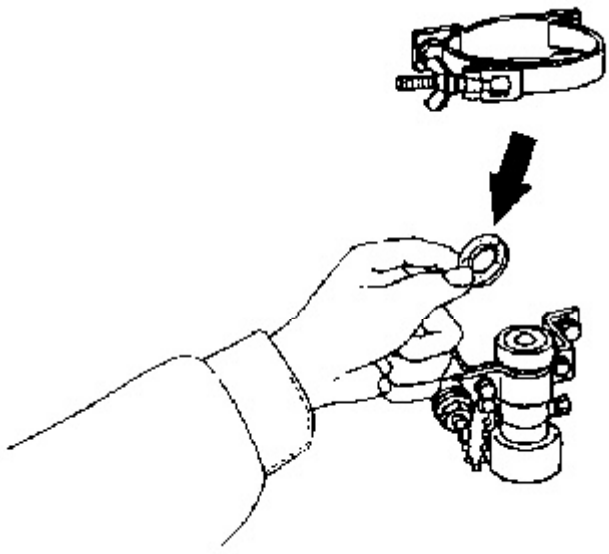

Illustration 2 g00751769

4. Remove the used gasket.
5. Install a new gasket.

   Note: A new gasket is provided with each new ether starting aid cylinder.
6. Install the new ether starting aid cylinder.
7. Tighten the ether starting aid cylinder hand tight.
8. Tighten the cylinder retaining clamp securely.
9. Close the access door.

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Product: EXCAVATOR
Model: 390F L EXCAVATOR MGF
Configuration: 390F L Excavator MGF00001-UP (MACHINE) POWERED BY C18 Engine

Operation and Maintenance Manual
390F Excavator
Media Number -SEBU8587-13 **Publication Date -01/09/2015** **Date Updated -23/02/2018**

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Engine Crankcase Breather - Clean

SMCS - 1317-070-DJ

NOTICE

Perform this maintenance with the engine stopped.

If the crankcase breather is not maintained on a regular basis, the crankcase breather will become plugged. A plugged crankcase breather will cause excessive crankcase pressure that may cause crankshaft seal leakage.

1. Unlatch the engine hood. Raise the engine hood.

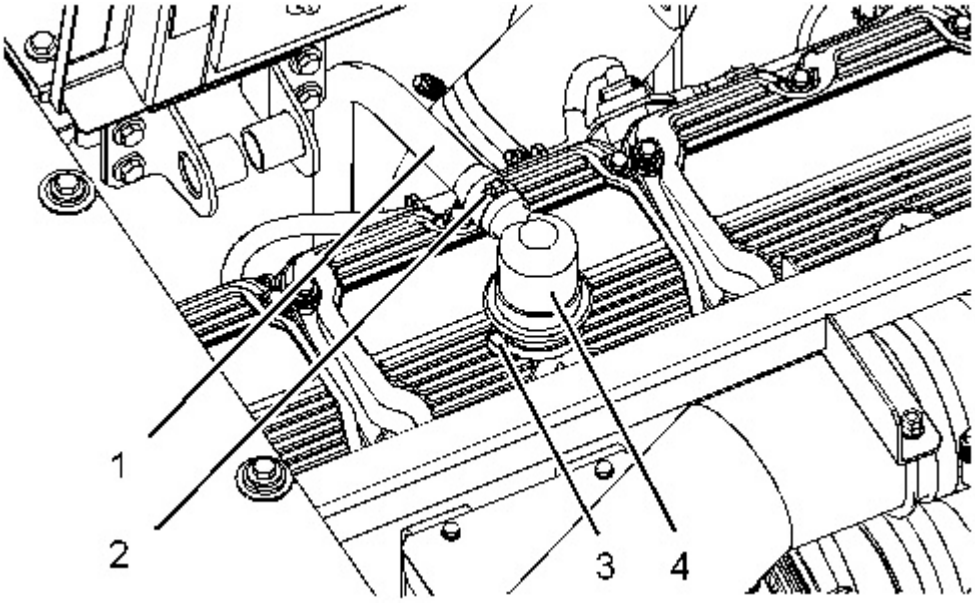

Illustration 1 g01127724

(1) Outlet hose
(2) Hose clamp
(3) Clamp for the breather
(4) Breather cover

2. Loosen the hose clamp (2). Disconnect the outlet hose (1) from the breather (4).
3. Loosen the clamp for the breather (3). Remove the breather and the seal.

   Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.
4. Wash the breather in a clean, nonflammable solvent.
5. Inspect the seal. If the seal is damaged, install a new seal.
6. Install the O-ring seal and the clean breather. Tighten the clamp for the breather.
7. Slide the hose onto the breather. Tighten the hose clamp.
8. Close the engine hood. Latch the engine hood.

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